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(54) Apparatus for gathering cut flowers

(57) An apparatus for gathering cut flowers (3) comprises a first conveyor (4) for supplying cut flowers (3) with an average first velocity and with a first spacing between successive cut flowers; a second conveyor (5) for receiving the cut flowers (3) from the first conveyor (4) and for conveying said cut flowers with an average second velocity smaller than the average first velocity of the first conveyor for positioning successive cut flowers at a second spacing smaller than the first spacing; and a third conveyor (6) for receiving the cut flowers from the second conveyor (5) and for conveying said cut flowers with an average third velocity smaller than the average second velocity of the second conveyor for positioning successive cut flowers in a bundle. In one embodiment the second conveyor (5) is driven alternately with a high velocity higher than the average second velocity and a low velocity smaller than the average second velocity (and preferably zero). The cut flowers (3) have a vertical position with the stem facing upwards while passing the first, second and third conveyors.

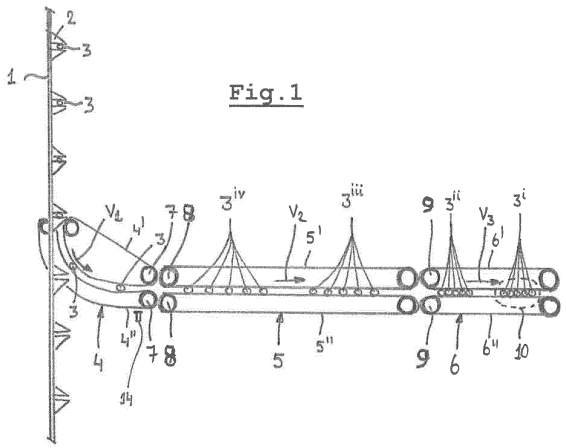


Fig.1

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Description

[0001] The invention relates to an apparatus for gathering cut flowers.

[0002] A known apparatus for gathering cut flowers is shown in NL-C-1009091. In this known apparatus the cut flowers one by one are positioned in a flexible element which is guided in a hoop between closing members. When the desired number of cut flowers is received within the hoop, the flexible element is tensioned and the closing members are pressed towards each other for creating a bundle of cut flowers which, next, by an appropriate movement of the gathering apparatus is transferred to a conveyor for being tied together.

[0003] This known apparatus is part of a device comprising a suspension conveyor in which the cut flowers are conveyed towards at least two gathering apparatuses. Arriving cut flowers are supplied alternately to the one and to the other gathering apparatus. As such, a desired output of the entire device may be achieved. However, when a gathering apparatus has competed a bundle and transfers it to the conveyor, said gathering apparatus for some time cannot receive cut flowers from the suspension conveyor, which have to be received therefore by another gathering apparatus or which have to remain longer in the suspension conveyor (for example by making another turn around the suspension conveyor, which however may lead to a disruption of the normal, regular feed of cut flowers to the suspension conveyor).

[0004] It is an object of the present invention to provide an improved apparatus for gathering cut flowers.

[0005] In accordance with the present invention the apparatus for gathering cut flowers comprises

- a first conveyor for supplying cut flowers with an average first velocity and with a first spacing between successive cut flowers;
- a second conveyor for receiving the cut flowers from the first conveyor and for conveying said cut flowers with an average second velocity smaller than the average first velocity of the first conveyor for positioning successive cut flowers at a second spacing smaller than the first spacing;
- a third conveyor for receiving the cut flowers from the second conveyor and for conveying said cut flowers with an average third velocity smaller than the average second velocity of the second conveyor for positioning successive cut flowers in a bundle;

wherein the cut flowers have a vertical position with the stem facing upwards while passing the first, second and third conveyors.

[0006] The first conveyor may receive the cut flowers from a supply, such as for example a suspension conveyor of a type known from the state of the art (for example as illustrated in NL-C-1009091 or NL-C-1009464). The vertical position of the cut flowers enhances the quality of the final bundles of cut flowers achieved with the present apparatus. The first spacing (for example about 300 mm) of the cut flowers at the first conveyor, among others, will depend from the ratio between the supply speed (for example the speed of a suspension conveyor) and the average first velocity and the spacing of the cut flowers at the supply (for example the distance between successive suspension members of a suspension conveyor). Because the average second velocity is smaller than the average first velocity, the cut flowers are positioned at a smaller second spacing at the second conveyor. This process is repeated during the transfer of the cut flowers from the second towards the third conveyor, at which the cut flowers are positioned sufficiently close for successive operations, such as for example tying the cut flowers together.

[0007] The apparatus according to the present Invention is capable of gathering cut flowers at a very high speed.

[0008] In a preferred embodiment of the apparatus according to the present invention, the second conveyor is drive alternately with a high velocity higher than the average second velocity and a low velocity smaller than the average second velocity.

[0009] Preferably, the low velocity substantially equal zero and occurs during receiving a cut flower from the first conveyor. This means that the second conveyor is at a standstill when a cut flower passes from the first towards the second conveyor. Immediately after receipt of said cut flower the second conveyor is driven with the high velocity until a next cut flower arrives. It is noted that the high velocity also may occur during whole of or only during part of the period between the arrival of two successive cut flowers.

[0010] Preferably at least one of the first, second and third conveyors is operated in a manner to achieve, at the third conveyor, separate bundles each comprising a desire number of cut flowers. Such separate bundles facilitate the further processing of the cut flowers.

[0011] In a preferred embodiment of such an apparatus, then, the second conveyor is operated in a manner to create at the second conveyor successive groups of cut flowers with each the desired number of cut flowers at said second spacing and with a larger third spacing between the last cut flower of a previous group and the first cut flower of a next group. For example, when bundles each comprising ten cut flowers have to be created, the second conveyor is driven in such a manner that every tenth spacing is larger than the other spacings.

[0012] Such a result may be achieved by an embodiment in which the high velocity of the second conveyor is temporarily increased between the moment of receiving from the first conveyor the last cut flower of a previous group and the moment of receiving from the first conveyor the first cut flower of a next group.

[0013] Preferably, then, the high velocity of the second conveyor is increased that much and that long that all cut flowers of a previous group have been transferred to the third conveyor before the first cut flower of a next group

is received from the first conveyor.

[0014] As a result the second conveyor can be kept very short (for example at most 160 mm long) and always only will carry at the same time at most the cut flowers of a shingle group. After completion of a group the second conveyor is emptied before again receiving the first cut flower of a next group.

[0015] In many instances it will be sufficient that the first and third conveyors are driven with a constant velocity (which, then, defines the respective average velocity). However, it is also possible that the first and/or third conveyor are driven in any other manner (for example alternately with two different velocities -of which one also may be zero- defining together the respective average velocity).

[0016] The result of the operation of the present apparatus will be that at the third conveyor separate groups (bundles) of closely positioned cut flowers are created which may be processed in any desired manner. For example, the apparatus according to the present invention further may be provided with at least one device for tying together a bundle of cut flowers positioned at the third conveyor. Such a device may be of any known type.

[0017] Preferably, the conveyors comprise belt conveyors with endless belts. For example each belt conveyor may comprise two opposite cooperating belts of which at least one is a driven belt. For good results (a regular and reproducible supply of cut flowers) it is preferred that opposite belts of a conveyor both are driven belts.

[0018] For effectively controlling the operation of the apparatus, it may be advantageous that it comprises at least one sensor positioned adjacent a conveyor for sensing a passing cut flower and generating a corresponding sensor signal, and a control unit for receiving said sensor signal and for, based thereon, sending a respective control signal to a drive source of a conveyor.

[0019] For example, such a sensor may be located at the end of the first conveyor for, eventually, controlling a drive source (for example an electric motor) of the second conveyor. This also allows to take into account a situation in which the supply of cut flowers by the first conveyor is temporarily interrupted, for example when a suspension member of a suspension conveyor feeding the cut flowers to the first conveyor, for whatever reason is empty.

[0020] Such a sensor may comprise an optical sensor, electrical sensor, mechanical sensor, capacitive sensor or any other type of sensor.

[0021] Of course a multitude of such sensors may be provided, if required.

[0022] For further processing the bundled and tied cut flowers it may be advantageous that the apparatus further comprises a tilting conveyor following the third conveyor for lilting the bundles of cut flowers to a horizontal position and a collecting conveyor for receiving and supporting said bundles in said horizontal position.

[0023] Hereinafter the invention will be elucidated by referring to the drawings, in which

Figure 1 schematically shows a top plan view of an embodiment of the apparatus according to the present invention;

Figure 2 schematically shows a side elevational view of the apparatus of figure 1;

Figure 3 schematically shows a side elevational view of part of a second embodiment of the apparatus according to the present invention, and

Figure 4 schematically shows a cross section according to IV-IV in figure 3.

[0024] Firstly referring to figure 1, a first embodiment of an apparatus for gathering cut flowers is shown in a top plan view. The cut flowers arrive from a suspension conveyor 1 with suspension members 2 for individual cut flowers 3. The apparatus comprises: a first conveyor 4 for supplying the cut flowers 3 with an average first velocity V_1 and with a first spacing between successive cut flowers; a second conveyor 5 for receiving the cut flowers 3 from the first conveyor 4 and for conveying said cut flowers with an average second velocity V_2 smaller than the average first velocity V_1 of the first conveyor 4 for positioning successive cut flowers at a second spacing smaller than the first spacing; and a third conveyor 6 for receiving the cut flowers 3 from the second conveyor 5 and for conveying said cut flowers with an average third velocity V_3 smaller than the average second velocity V_2 of the second conveyor for positioning successive cut flowers in a bundle.

[0025] Each conveyor 4-6 comprises a belt conveyors with two opposite cooperating endless belts 4'-6' and 4"-6", of which at least one is driven (for example by drums 7-9).

[0026] In the illustrate embodiment the first and third conveyors 4,6 are driven with a constant velocity V_1 and V_3, respectively. The second conveyor 5, however, is driven alternately with a high velocity higher than the average second velocity V_2 and a low velocity smaller than the average second velocity V_2. Preferably said low velocity will be zero and will occur during receiving a cut flower 3 from the first conveyor 4.

[0027] In a specific embodiment, the high velocity of the second conveyor 5 is temporarily increased between the moment of receiving from the first conveyor 4 the last cut flower of a previous group (for example group 3^{iii}) and the moment of receiving from the first conveyor 4 the first cut flower of a next group (for example group 3^{iv}). As a result the second conveyor 5 is operated in a manner to create at the second conveyor successive groups (3^{i}, 3^{ii}, 3^{iii}, 3^{iv}, ..) of cut flowers 3 with each the desired number (in the illustrated embodiment five) of cut flowers at said second spacing and with a larger third spacing between the last cut flower of a previous group and the first cut flower of a next group.

[0028] Although in figures 1 and 2 the second conveyor 5 has been illustrated with a length sufficient to receive two groups 3^{iii} and 3^{iv} simultaneously, it preferably will have a shorter length (for example at most 160 mm long)

such that it always only will carry at the same time at most the cut flowers of a single group. After completion of such a group the second conveyor 5 is emptied (by transferring the cut flowers to the third conveyor 6) before again receiving the first cut flower of a next group. Such a result may be achieved by an embodiment in which the high velocity of the second conveyor 5 is temporarily increased between the moment of receiving from the first conveyor 4 the last cut flower of a previous group and the moment of receiving from the first conveyor the first cut flower of a next group. Specifically, the high velocity of the second conveyor is increased that much and that long that all cut flowers of a previous group have been transferred to the third conveyor 6 before the first cut flower of a next group is received from the first conveyor 4.

[0029] As a result the second conveyor can be kept very short

[0030] At the third conveyor 6 the cut flowers of a group (for example groups 3^{i} and 3^{ii}) are positioned even closer together for forming a bundle and may be tied together by a device 10 (indicated schematically by dotted lines) for tying together a bundle of cut flowers 3 positioned at the third conveyor 6. There may be provided more than one such device 10 which may be of any known type.

[0031] Because of the original suspended position of the cut flowers 3 in the suspension conveyor 1, the cut flowers have a vertical position with the stem facing upwards while passing the first, second and third conveyors 4-6. Thus, in an embodiment of the apparatus illustrated in part in figures 3 and 4, a tilting conveyor 11 with guide 11' and suspension conveyor 11" is illustrate following the third conveyor 6 for tilting the bundles 13, 13', 13" of cut flowers to a horizontal position. In such a position the bundles may be supplied to a collecting conveyor 12 for receiving and supporting said groups in said horizontal position. Next the bundles may be processed further as desired (for example passing a wrapping station).

[0032] For effectively controlling the operation of the apparatus, it may be advantageous that it comprises at least one sensor 14 (figures 1 and 2) positioned adjacent a conveyor for sensing a passing cut flower and generating a corresponding sensor signal, and a control unit 15 (figure 2) for receiving said sensor signal and for, based thereon, sending a respective control signal to a drive source of a conveyor.

[0033] For example, such a sensor 14 may be located at the end of the first conveyor 4 for, eventually, controlling a drive source (for example an electric motor not illustrated) of the second conveyor 5. This also allows to take into account a situation in which the supply of cut flowers 3 by the first conveyor 4 is temporarily interrupted, for example when one or a number of suspension members 2 of the suspension conveyor 1 feeding the cut flowers 3 to the first conveyor 4, for whatever reason is empty.

[0034] Such a sensor may comprise an optical sensor, electrical sensor, mechanical sensor, capacitive sensor or any other type of sensor.

[0035] Of course a multitude of such sensors may be provided, if required (for example also at the end of the second conveyor 5 for controlling the third conveyor 6).

[0036] The invention is not limited to the embodiments described before which may be varied widely within the scope of the invention as defined by the appending claims.

Claims

1. Apparatus for gathering cut flowers, comprising

   - a first conveyor for supplying cut flowers with an average first velocity and with a first spacing between successive cut flowers;
   - a second conveyor for receiving the cut flowers from the first conveyor and for conveying said cut flowers with an average second velocity smaller than the average first velocity of the first conveyor for positioning successive cut flowers at a second spacing smaller than the first spacing;
   - a third conveyor for receiving the cut flowers from the second conveyor and for conveying said cut flowers with an average third velocity smaller than the average second velocity of the second conveyor for positioning successive cut flowers in a bundle;

   wherein the cut flowers have a vertical position with the stem facing upwards while passing the first, second and third conveyors.

2. Apparatus according to claim 1, wherein the second conveyor is driven alternately with a high velocity higher than the average second velocity and a low velocity smaller than the average second velocity.

3. Apparatus according to claim 2, wherein the low velocity substantially equal zero and occurs during receiving a cut flower from the first conveyor.

4. Apparatus according to claim 2 or 3, wherein at least one of the first, second and third conveyors is operated in a manner to achieve, at the third conveyor, separate bundles each comprising a desired number of cut flowers.

5. Apparatus according to claim 4, wherein the second conveyor is operated in a manner to create at the second conveyor successive groups of cut flowers with each the desired number of cut flowers at said second spacing and with a larger third spacing between the last cut flower of a previous group and the first cut flower of a next group.

6. Apparatus according to claim 5, wherein the high velocity of the second conveyor is temporarily increased between the moment of receiving from the

first conveyor the last cut flower of a previous group and the moment of receiving from the first conveyor the first cut flower of a next group.

7. Apparatus according to claim 6, wherein the high velocity of the second conveyor is increased that much and that long that all cut flowers of a previous group have been transferred to the third conveyor before the first cut flower of a next group is received from the first conveyor.

8. Apparatus according to any of the previous claims, wherein the first and third conveyors are driven with a constant velocity.

9. Apparatus according to any of the previous claims, further provided with at least one device for tying together a bundle of cut flowers positioned at the third conveyor.

10. Apparatus according to any of the previous claims, wherein the conveyors comprise belt conveyors with endless belts.

11. Apparatus according to claim 10, wherein each belt conveyor comprises two opposite cooperating belts of which at least one is a driven belt.

12. Apparatus according to claim 11, wherein the opposite belts of a conveyor both are driven belts.

13. Apparatus according to any of the previous claims, comprising at least one sensor positioned adjacent a conveyor for sensing a passing cut flower and generating a corresponding sensor signal, and a control unit for receiving said sensor signal and for, based thereon, sending a respective control signal to a drive source of a conveyor.

14. Apparatus according to claim 13, wherein the sensor comprises an optical sensor, electrical sensor, mechanical sensor, capacitive sensor or any other type of sensor.

15. Apparatus according to any of previous claims, further comprising a tilting conveyor following the third conveyor for tilting the bundles of cut flowers to a horizontal position and a collecting conveyor for receiving and supporting said bundles in said horizontal position.

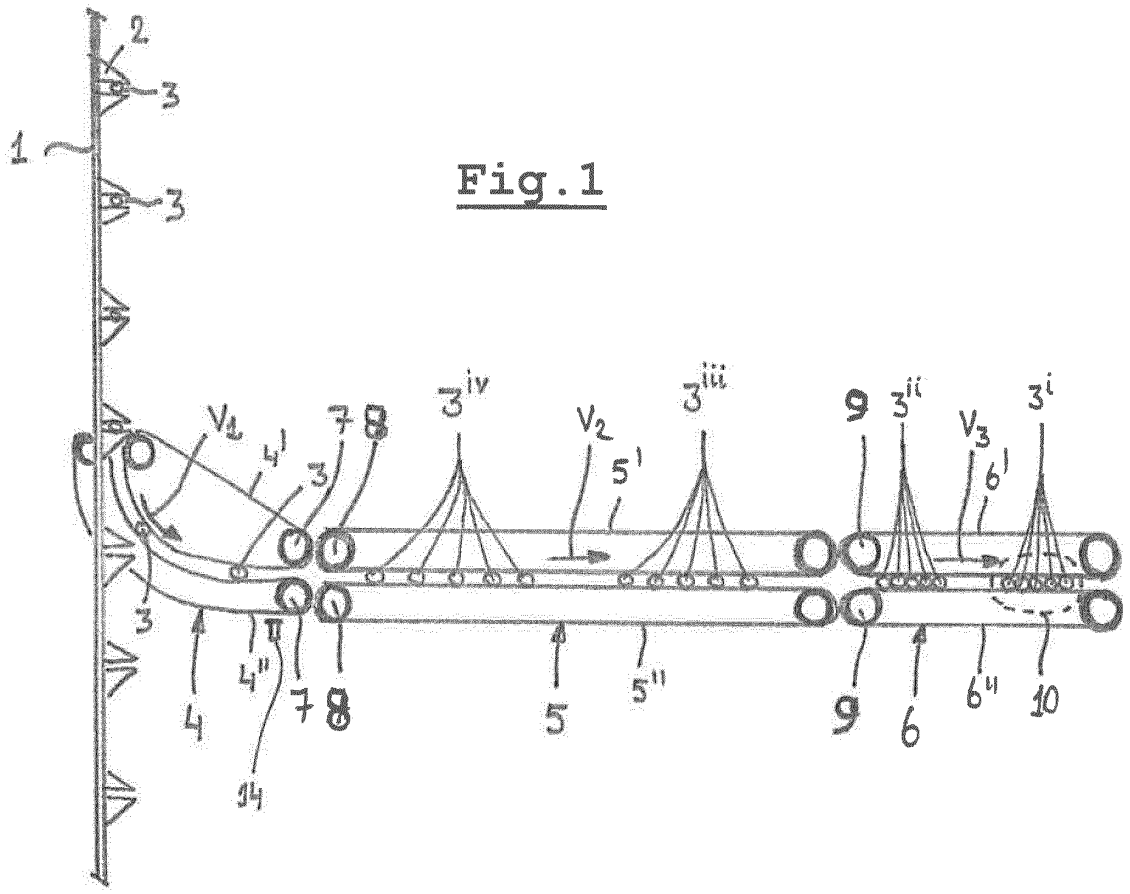

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V2
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3ii
3i

Fig.1

Fig.2

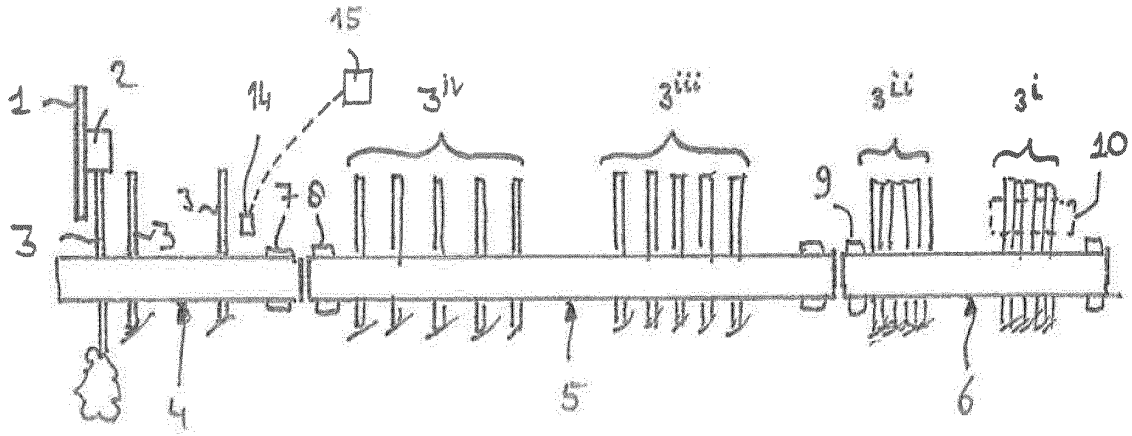

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Fig.3

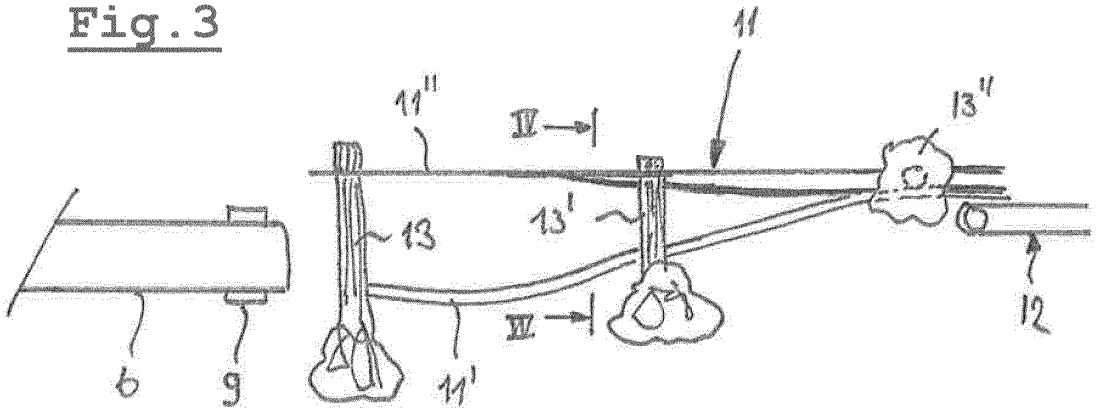
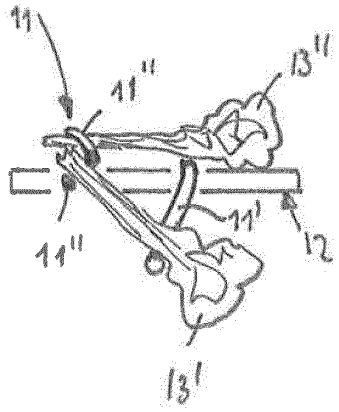


Fig.4



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EUROPEAN SEARCH REPORT

Application Number
EP 12 18 9936

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 0 449 386 A1 (A. TAS) 2 October 1991 (1991-10-02) * column 4, line 22 - column 6, line 24; figures * -----	1	INV. B65B25/02 B65G47/08 B65G47/31 A01G5/02
A	NL 8 700 928 A (A. DEN HEIJER) 16 November 1988 (1988-11-16) * page 2, line 33 - page 4, line 40; figures * -----	1	ADD. B65G15/14

TECHNICAL FIELDS SEARCHED (IPC)

B65B
B65G
A01G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 March 2013	Jagusiak, Antony

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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REFERENCES CITED IN THE DESCRIPTION

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